

Commissioner is hereby authorized to charge the same to our Deposit Account No. 50-1570.

Please amend the above-identified application as follows:

IN THE CLAIMS:

Please cancel claims ~~98 to 128~~, without prejudice, and add new claims 129 to 159 as follows:

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F1
29. (New) A method of identifying a compound of interest in a library of compounds, each of said compounds being bound to a solid support and produced by a unique reaction series composed of N reaction steps, wherein N is an integer of at least 2, and wherein each compound is produced from components which are independently the same or different, the method comprising :
- (a) dividing a population of solid supports into M batches;
- (b) reacting each of the M batches of solid support with a component, so that the component forms a bond with the solid support;
- (c) adding to each batch, prior to (b), concurrently with (b), or subsequently to (b), a spectrally distinguishable fluorophore tag uniquely associated with each component and reaction step, said fluorophore tag being capable of forming a bond to the solid support, wherein said fluorophore tag represents one or more bits of binary code and comprises zero, one, or more than one fluorescent dye(s), said dye(s) being spectrally distinguishable by wavelength, excited-state lifetime or emission intensity;
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- (d) recombining all of said M batches after (b) and (c);
- (e) repeating (a) to (d) for N-1 times, or repeating (a) to (d) for N-2 times followed by repeating (a) to (c) once, to produce a library of compounds;
- (f) contacting the library of compounds with a target biomolecule, wherein the target biomolecule is capable of binding to a compound in the library having a property of interest; and
- (g) decoding the fluorophore tag(s) associated with the compound having the property of interest to identify said compound, wherein the decoding is carried out without isolating the solid support of interest from other solid supports and without detaching the tag(s) from the solid support of interest and comprises optically interrogating the fluorophore tag(s) bound to the solid support on which the compound having the property of interest was produced.

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130. (New) The method of claim 129, wherein the solid support comprises a bead.
131. (New) The method of claim 129, wherein (e) comprises repeating (a) to (d) for N-1 times to produce a library of compounds.
132. (New) The method of claim 129, wherein (e) comprises repeating (a) to (d) for N-2 times followed by repeating (a) to (c) once to produce a library of compounds.
133. (New) The method of claim 132, further comprising recombining said M batches subsequent to contacting the library of compounds with the target biomolecule.

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134. (New) The method of claim 129, wherein the fluorophore tags added in (c) are in sub-stoichiometric amount compared to the components added in (b).
135. (New) The method of claim 129, wherein the fluorophore tags added in (c) are from about 0.001 to about 0.1 molar equivalent of the components added in (b).
136. (New) The method of claim 129, wherein the optical interrogation of the fluorophore tags comprises determining the value of each of the constituent fluorescent dyes.
137. (New) The method of claim 129, wherein the fluorophore tags are attached to the solid supports by covalent bonding.
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138. (New) The method of claim 129, wherein the fluorophore tag is capable of forming a bond to the solid support directly or to the component attached to said solid support.
139. (New) The method of claim 129, wherein the fluorescent dyes comprise dyes selected from the group consisting of compounds with the following chemical names:

3-(ϵ -carboxypentyl)-3'-ethyl-oxacarbocyanine-6,6'-disulfonic acid

1-(ϵ -carboxypentyl)-1'-ethyl-3,3,3',3'-tetramethylindocarbocyanine-5,5'-disulfonic acid

1-(ϵ -carboxypentyl)-1'-ethyl-3,3,3',3'-tetramethyl-3H-benz(e)indocarbocyanine-5,5',7,7'-tetrasulfonic acid

1-(ϵ -carboxypentyl)-1'-ethyl-3,3,3',3'-tetramethylindocarbocyanine-5,5'-disulfonic acid

1-(ε-carboxypentyl)-1'-ethyl-3,3,3',3'-tetramethyl-3H-

benz(e)indodicarbocyanine-5,5',7,7'-tetrasulfonic acid

1-(ε-carboxypentyl)-1'-ethyl-3,3,3',3'-tetramethylindotricarbocyanine-5,5'-disulfonic acid

and are activated as active esters selected from the group consisting of succinimidyl, sulfosuccinimidyl, p-nitrophenol, pentafluorophenol, HOBt and N-hydroxypiperidyl.

140. (New) The method of claim 129, wherein the fluorescent dyes comprise dyes selected from the group consisting of compounds with the following chemical names:

6-((4,4-difluoro-5,7-dimethyl-4-bora-3a,4a-diaza-s-indacene-3-propionyl)amino) hexanoic acid

6-((4,4-difluoro-5-phenyl-4-bora-3a,4a-diaza-s-indacene-3-propionyl)amino) hexanoic acid,

6-((4,4-difluoro-1,3-dimethyl-5-(4-methoxyphenyl)-4-bora-3a,4a-diaza-s-indacene-2-propionyl) amino)hexanoic acid,

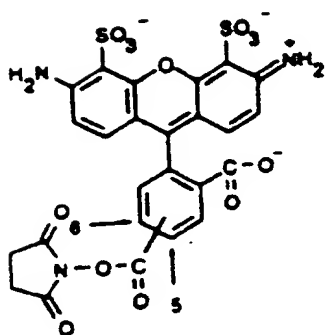
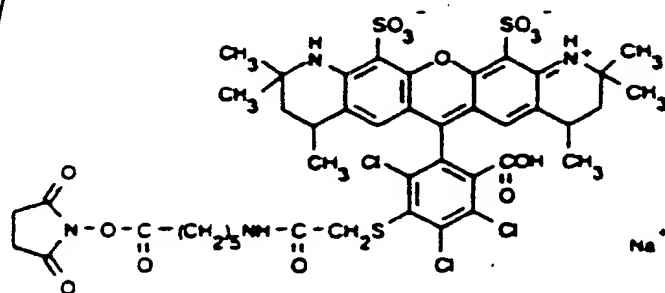
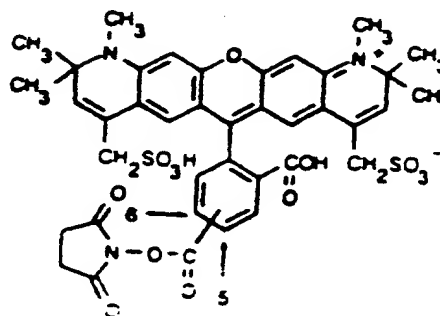
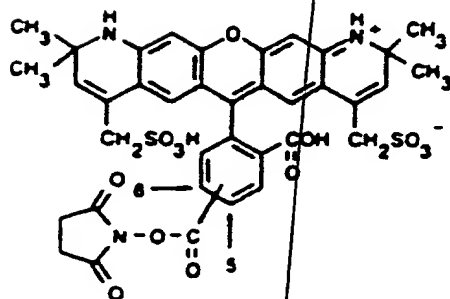
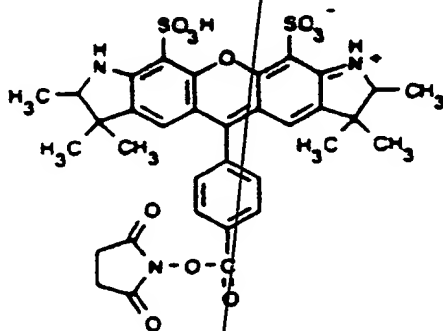
6-(((4-(4,4-difluoro-5-(2-thienyl)-4-bora-3a,4a-diaza-s-indacene-3-yl)phenoxy) acetyl) amino)hexanoic acid,

6-(((4-(4,4-difluoro-5-(2-thienyl)-4-bora-3a,4a-diaza-s-indacene-3-yl)styryloxy) acetyl) aminohexanoic acid, and

6-(((4-(4,4-difluoro-5-(2-pyrrolyl)-4-bora-3a,4a-diaza-s-indacene-3-yl)styryloxy) acetyl)aminohexanoic acid,

and are activated as active esters selected from the group consisting of succinimidyl, sulfosuccinimidyl, p-nitrophenol, pentafluorophenol, HOBt and N-hydroxypiperidyl.

141. (New) The method of claim 129, wherein the fluorescent dyes comprise dyes selected from the group consisting of compound with the following chemical structures:

 2Li^+  Na^+ 

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142. (New) The method of claim 129, wherein (g) is carried out using multi-color fluorescent imaging or spectral analysis.
143. (New) The method of claim 129, wherein the decoding is carried out using multi-color fluorescent imaging in combination with spectral analysis.
144. (New) The method of claim 129, wherein M is an integer from at least 2 to 25.
145. (New) The method of claim 129, wherein the component is protected or unprotected at a group which is capable of participating in a further coupling and orthogonally protected at non-participating group(s), and wherein (d) further comprises cleaving any protecting group of the component which is to participate in a further coupling.
146. (New) The method of claim 129, wherein the fluorescent dyes are spectrally distinguishable by emission wavelength.
147. (New) The method of claim 129, wherein the fluorescent dyes are spectrally distinguishable by emission intensity, the emission intensity being distinguishable by adjusting the ratio of the relative quantities of each fluorophore dye.
148. (New) The method of claim 147, wherein the fluorophore tag comprises two fluorescent dyes, the ratio of said dyes being about 1:1 to 4:1.
149. (New) The method of claim 129, wherein the fluorescent dyes are spectrally distinguishable by excited-state lifetime.

150. (New) The method of 129, wherein the fluorescent dyes are spectrally distinguishable by emission wavelength, excited-state lifetime and emission intensity.
151. (New) The method of claim 129, wherein the compound of interest comprises an oligonucleotide or nucleic acid.
152. (New) The method of claim 129, wherein the compound of interest comprises an oligopeptide or protein.
153. (New) The method of claim 129, wherein the compound of interest comprises a ligand.
154. (New) The method of claim 129 wherein N is an integer from at least 4 to about 12.
155. (New) The method of claim 130, wherein the decoding is carried out while the beads are on a planar substrate.
156. (New) The method of claim 155, wherein the optical interrogation is carried out using multi-color fluorescent imaging in combination with spectral analysis.
157. (New) The method of claim 130, wherein the decoding is carried out while the beads are arranged in a planar bead array.
158. (New) The method of claim 157, wherein the optical interrogation is carried out using multi-color fluorescent imaging in combination with spectral analysis.
159. (New) The method of claim 130, wherein the bead is composed of a material selected